

What Is Claimed Is:

1. A method of fabricating a PZT film on a semiconductor wafer comprising:
  - forming a front-end structure over a semiconductor substrate;
  - forming a bottom electrode over said front-end structure;
  - preheating said semiconductor wafer; and
  - forming a PZT film over said bottom electrode;

wherein said preheating step comprises heating said semiconductor wafer in an ambient comprised of a mixture of an inert gas and an oxidizer gas.
2. The method of Claim 1 wherein said inert gas is He.
3. The method of Claim 1 wherein said inert gas is Ar.
4. The method of Claim 1 wherein said inert gas is N.
5. The method of Claim 1 wherein said oxidizer gas is O<sub>2</sub>.
6. The method of Claim 1 wherein said oxidizer gas is N<sub>2</sub>O.
7. The method of Claim 1 wherein said oxidizer gas is O<sub>3</sub>.
8. The method of Claim 3, wherein Ar comprises at least 20% of the flow of said inert/oxidizer gas mixture.

9. The method of Claim 1 wherein said PZT film contains at least 2% excess Pb from the stoichiometric composition of  $Pb_{1.0}(Zr,Ti)_{1.0}O_3$ .

10. The method of Claim 1 wherein said PZT film is  $PbZrO_3$ .

11. The method of Claim 1 wherein said PZT film is  $PbTiO_3$ .

12. The method of Claim 1 wherein said PZT film is a solid solution of the component end members  $PbZrO_3$  and  $PbTiO_3$ .

13. The method of Claim 1 wherein said PZT film is doped up to 5% with either La or Nb.

14. The method of Claim 1 wherein a ferroelectric capacitor is fabricated by further forming a top electrode over said PZT film.

15. The method of Claim 1 wherein said bottom electrode is comprised of a material selected from the group consisting of: Ir,  $IrO_x$ , or a stack thereof.

16. The method of Claim 14 wherein said top electrode is comprised of a material selected from the group consisting of: Ir,  $IrO_x$ , or a stack thereof.

17. A method of fabricating a PZT film on a semiconductor wafer comprising:

forming a front-end structure over a semiconductor substrate;

forming a bottom electrode over said front-end structure;

preheating said semiconductor wafer; and

forming a PZT film over said bottom electrode;

wherein said preheating step comprises heating said semiconductor wafer in an inert gas.

18. The method of Claim 17 wherein said inert gas is He.

19. The method of Claim 17 wherein said inert gas is Ar.

20. The method of Claim 17 wherein said inert gas is N<sub>2</sub>.

21. The method of Claim 17 wherein said PZT film contains at least 2% excess Pb from the stoichiometric composition of Pb<sub>1.0</sub>(Zr,Ti)<sub>1.0</sub>O<sub>3</sub>.

22. The method of Claim 17 wherein said PZT film is PbZrO<sub>3</sub>.

23. The method of Claim 17 wherein said PZT film is PbTiO<sub>3</sub>.

24. The method of Claim 17 wherein said PZT film is a solid solution of the component end members PbZrO<sub>3</sub> and PbTiO<sub>3</sub>.

25. The method of Claim 17 wherein said PZT film is doped up to 5% with either La or Nb.

26. The method of Claim 17 wherein a ferroelectric capacitor is fabricated by further forming a top electrode over said PZT film.

27. The method of Claim 17 wherein said bottom electrode is comprised of a material selected from the group consisting of: Ir, IrO<sub>x</sub>, or a stack thereof.

28. The method of Claim 26 wherein said top electrode is comprised of a material selected from the group consisting of: Ir, IrO<sub>x</sub>, or a stack thereof.

29. A method of fabricating a PZT film over a semiconductor wafer comprising:  
forming a front-end structure;  
forming a bottom electrode over said front-end structure;  
preheating said semiconductor wafer; and  
forming a PZT film over said bottom electrode;  
wherein said preheating step comprises heating said semiconductor wafer in a vacuum.

30. The method of Claim 29 wherein said PZT film contains at least 2% excess Pb from the stoichiometric composition of Pb<sub>1.0</sub>(Zr,Ti)<sub>1.0</sub>O<sub>3</sub>.

31. The method of Claim 29 wherein said PZT film is PbZrO<sub>3</sub>.

32. The method of Claim 29 wherein said PZT film is  $\text{PbTiO}_3$ .

33. The method of Claim 29 wherein said PZT film is a solid solution of the component end members  $\text{PbZrO}_3$  and  $\text{PbTiO}_3$ .

34. The method of Claim 29 wherein said PZT film is doped up to 5% with either La or Nb.

35. The method of Claim 29 wherein a ferroelectric capacitor is fabricated by further forming a top electrode over said PZT film.

36. The method of Claim 29 wherein said bottom electrode is comprised of a material selected from the group consisting of: Ir,  $\text{IrO}_x$ , or a stack thereof.

37. The method of Claim 35 wherein said top electrode is comprised of a material selected from the group consisting of: Ir,  $\text{IrO}_x$ , or a stack thereof.

38. A method of fabricating an electronic device that includes a PZT film situated over a semiconductor substrate comprising:

forming a front-end structure over said semiconductor substrate;

forming a bottom electrode over said front-end structure;

preheating a semiconductor wafer containing said electronic device; and

forming a PZT film over said bottom electrode;

wherein said preheating step comprises heating said semiconductor wafer in an

ambient comprised of a mixture of an inert gas and an oxidizer gas.

39. The method of Claim 38 wherein said inert gas is He.

40. The method of Claim 38 wherein said inert gas is Ar.

41. The method of Claim 38 wherein said inert gas is N<sub>2</sub>.

42. The method of Claim 38 wherein said oxidizer gas is O<sub>2</sub>.

43. The method of Claim 38 wherein said oxidizer gas is N<sub>2</sub>O.

44. The method of Claim 38 wherein said oxidizer gas is O<sub>3</sub>.

45. The method of Claim 40, wherein Ar comprises at least 20% of the flow of said inert/oxidizer gas mixture.

46. The method of Claim 38 wherein said PZT film contains at least 2% excess Pb from the stoichiometric composition of Pb<sub>1.0</sub>(Zr,Ti)<sub>1.0</sub>O<sub>3</sub>.

47. The method of Claim 38 wherein said PZT film is PbZrO<sub>3</sub>.

48. The method of Claim 38 wherein said PZT film is PbTiO<sub>3</sub>.

49. The method of Claim 38 wherein said PZT film is a solid solution of the component end members PbZrO<sub>3</sub> and PbTiO<sub>3</sub>.

50. The method of Claim 38 wherein said PZT film is doped up to 5% with either La or Nb.

51. The method of Claim 38 wherein a ferroelectric capacitor is fabricated by further forming a top electrode over said PZT film.

52. The method of Claim 38 wherein said bottom electrode is comprised of a material selected from the group consisting of: Ir, IrO<sub>x</sub>, or a stack thereof.

53. The method of Claim 51 wherein said top electrode is comprised of a material selected from the group consisting of: Ir, IrO<sub>x</sub>, or a stack thereof.

54. A method of fabricating an electronic device that includes a PZT film situated over a semiconductor substrate comprising:  
forming a front-end structure;  
forming a bottom electrode over said front-end structure;  
preheating a semiconductor wafer containing said electronic device; and  
forming a PZT film over said bottom electrode;  
wherein said preheating step comprises heating said semiconductor wafer in a vacuum.

55. The method of Claim 54 wherein said PZT film contains at least 2% excess Pb from the stoichiometric composition of  $\text{Pb}_{1.0}(\text{Zr},\text{Ti})_{1.0}\text{O}_3$ .

56. The method of Claim 54 wherein said PZT film is  $\text{PbZrO}_3$ .

57. The method of Claim 54 wherein said PZT film is  $\text{PbTiO}_3$ .

58. The method of Claim 54 wherein said PZT film is a solid solution of the component end members  $\text{PbZrO}_3$  and  $\text{PbTiO}_3$ .

59. The method of Claim 54 wherein a ferroelectric capacitor is fabricated by further forming a top electrode over said PZT film.

60. The method of Claim 54 wherein said bottom electrode is comprised of a material selected from the group consisting of: Ir,  $\text{IrO}_x$ , or a stack thereof.

61. The method of Claim 59 wherein said top electrode is comprised of a material selected from the group consisting of: Ir,  $\text{IrO}_x$ , or a stack thereof.

62. A method of fabricating an electronic device that includes a PZT film situated over a semiconductor substrate comprising:

forming a front-end structure over a semiconductor substrate;

forming a bottom electrode over said front-end structure;

preheating said semiconductor wafer; and

forming a PZT film over said bottom electrode;

wherein said preheating step comprises heating said semiconductor wafer in an inert gas.

63. The method of Claim 62 wherein said inert gas is He.

64. The method of Claim 62 wherein said inert gas is Ar.

65. The method of Claim 62 wherein said inert gas is N<sub>2</sub>.

66. The method of Claim 62 wherein said PZT film contains at least 2% excess Pb from the stoichiometric composition of Pb<sub>1.0</sub>(Zr,Ti)<sub>1.0</sub>O<sub>3</sub>.

67. The method of Claim 62 wherein said PZT film is PbZrO<sub>3</sub>.

68. The method of Claim 62 wherein said PZT film is PbTiO<sub>3</sub>.

69. The method of Claim 62 wherein said PZT film is a solid solution of the component end members PbZrO<sub>3</sub> and PbTiO<sub>3</sub>.

70. The method of Claim 62 wherein said PZT film is doped up to 5% with either La or Nb.

71. The method of Claim 62 wherein a ferroelectric capacitor is fabricated by further forming a top electrode over said PZT film.

72. The method of Claim 62 wherein said bottom electrode is comprised of a material selected from the group consisting of: Ir,  $\text{IrO}_x$ , or a stack thereof.

73. The method of Claim 71 wherein said top electrode is comprised of a material selected from the group consisting of: Ir,  $\text{IrO}_x$ , or a stack thereof.

74. A haze free PZT film prepared in accordance with Claim 1.

75. A haze free PZT film prepared in accordance with Claim 17.

76. A haze free PZT film prepared in accordance with Claim 29.

77. A haze free PZT film prepared in accordance with Claim 38.

78. A haze free PZT film prepared in accordance with Claim 54.

79. A haze free PZT film prepared in accordance with Claim 62.